BILAL A. KHAN
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https://systemic-inquiry.com

EDUCATION

Ph.D. in Mathematics, City University of New York, 2003 [Advisors: A. Miasnikov, J. Pach, J. Roitberg]
Algorithmic problems on automorphic conjugacy in the free group of rank 2.

M.Sc. in Computer Science, Johns Hopkins University, 1997 [Advisor: B. Awerbuch]
New algorithms for topology aggregation and competitive on-line routing.

B.Sc. in Mathematics & Computer Science, Massachusetts Institute of Technology, 1993 [Advisor: M. Sipser]

EMPLOYMENT

Lehigh University

Professor of Data Science in the Dept of Biostatistics & Health Data Science	Jan. 2022 – present
Professor in Dept of Computer Science	Jan. 2022 – present
Director, Health Data Warehouse	Jan. 2022 – present

University of Nebraska-Lincoln

Adjunct Faculty, Department of Sociology	Jan. 2020 – present
Happold Professor of Computer Science and Sociology	Jan. 2016 – Jan. 2020
Co-Director, Longitudinal Networks Core, Rural Drug Addiction Center (NIH CoBRE)	July 2019 – Jan. 2020

John Jay College of Criminal Justice, City University of New York

Professor of Mathematics and Computer Science	Sep. 2009 – Dec. 2015
Associate Professor of Mathematics and Computer Science	Sep. 2004 – Aug. 2009
Doctoral Faculty in Criminal Justice	Jan. 2008 – Dec. 2015
Doctoral Faculty in Computer Science	Jan. 2005 – Dec. 2015
Co-Director, NYC Social Networks Research Group	Jan. 2009 – Dec. 2015
Director of Laboratory for Cybersecurity	Sep. 2004 – Dec. 2015
Research Affiliate, Center for Drug Use & HIV Research (NYU)	Aug. 2011 – Aug. 2019
Research Affiliate, Center for Court Innovation (NYC)	Oct. 2009 – Mar. 2012

Center for Comp Science, U.S. Naval Research Laboratory

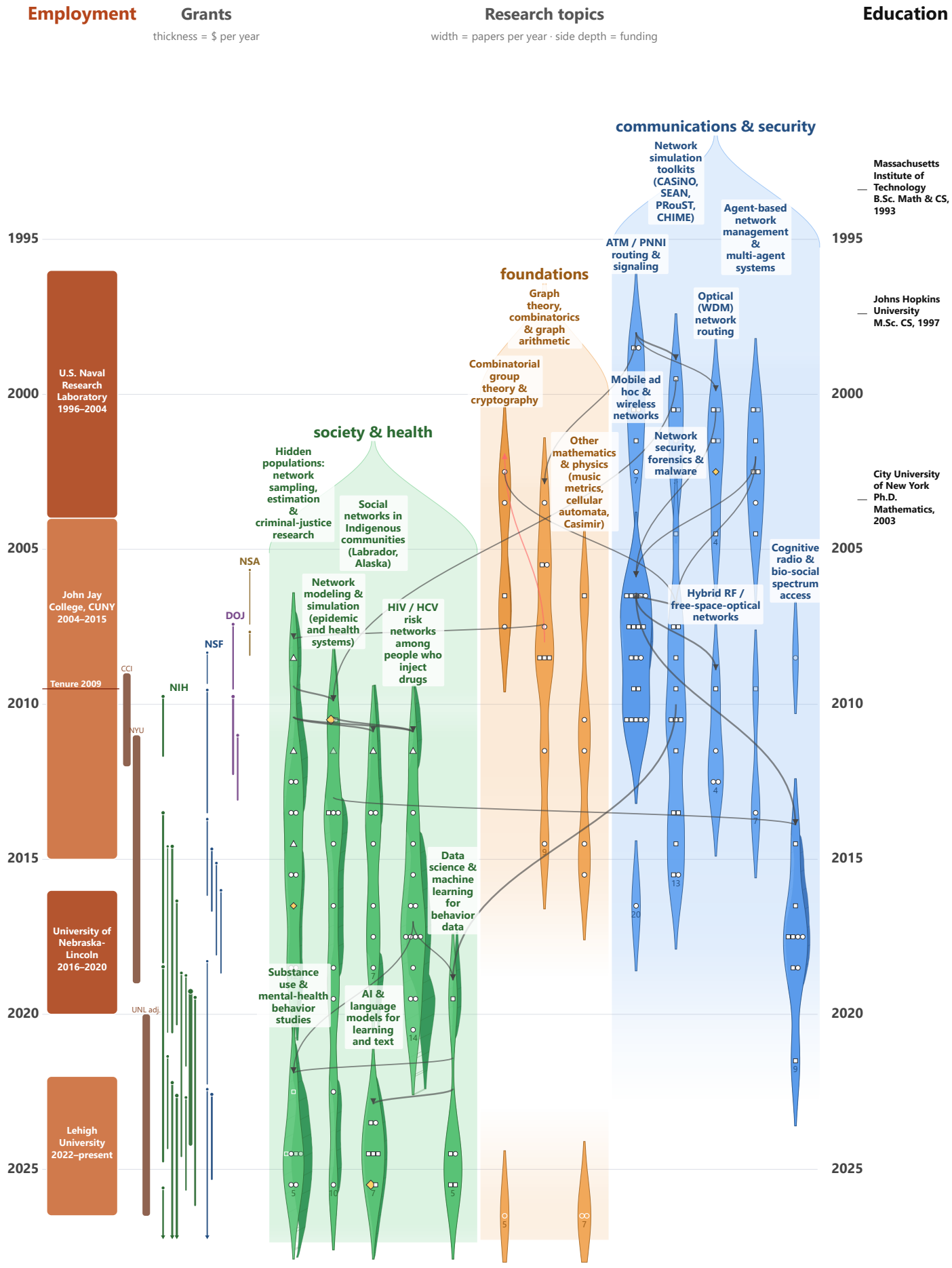
Research Scientist, Networks Group	1996 – Sep. 2004

SUMMARY OF RESEARCH PERFORMANCE METRICS

Publications	Refereed manuscripts: 144	Citations: 2572	h-index: 23
Grants	Completed: 24	Current: 4	
Mentorship	Postdocs: 6	Ph.D. advisees: 8	Masters advisees: 15

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Employment
Grants
thickness = $ per year
Research topics
width = papers per year · side depth = funding
Education
communications & security
Network simulation toolkits (CASiNO, SEAN, PRouST, CHIME)
Agent-based network management & multi-agent systems
ATM / PNNI routing & signaling
Optical (WDM) network routing
Mobile ad hoc & wireless networks
Network security, forensics & malware
Cognitive radio & bio-social spectrum access
Hybrid RF / free-space-optical networks
foundations
Graph theory, combinatorics & graph arithmetic
Combinatorial group theory & cryptography
Other mathematics & physics (music metrics, cellular automata, Casimir)
society & health
Hidden populations: network sampling, estimation & criminal-justice research
Social networks in Indigenous communities (Labrador, Alaska)
Network modeling & simulation (epidemic and health systems)
HIV / HCV risk networks among people who inject drugs
Data science & machine learning for behavior data
Substance use & mental-health behavior studies
AI & language models for learning and text
1995
2000
2005
2010
2015
2020
2025
U.S. Naval Research Laboratory 1996–2004
John Jay College, CUNY 2004–2015
Tenure 2009
University of Nebraska-Lincoln 2016–2020
Lehigh University 2022–present
CCI
NYU
UNL adj.
NIH
NSF
DOJ
NSA
Massachusetts Institute of Technology B.Sc. Math & CS, 1993
Johns Hopkins University M.Sc. CS, 1997
City University of New York Ph.D. Mathematics, 2003

HISTORICAL INDEX OF REFEREED PUBLICATIONS

SOCIETY & HEALTH ↑

Hidden populations: network sampling, estimation & criminal-justice research ↑

1. Bilal Khan, Hsuan-Wei Lee, Ian Fellows, and Kirk Dombrowski. One-step estimation of networked population size: Respondent-driven capture-recapture with anonymity. *PLoS One*, Vol. 13(4), Article e0195959, 2018. DOI
2. Bilal Khan, Hsuan-Wei Lee, C R. Thrash, and K Dombrowski. Agency and Social Constraint among Victims of Domestic Minor Sex Trafficking: A Method for Measuring Free Will. *Social Science Research*, Vol. 76, pp. 144-156, 2018.
3. Bilal Khan, Mitchell Downey, Meredith Dank, and Kirk Dombrowski. A method for determining the size of the underground cash economy for commercial sex in seven. In *The Oxford Handbook of the Economics of Prostitution*, edited by Scott Cunningham; Manisha Shah, Oxford University Press, 2016, pp. 348-368.
4. Bilal Khan, Kirk Dombrowski, Ric Curtis, and Travis Wendel. Estimating Vertex Measures in Social Networks by Sampling Completions of RDS Trees. *Social Networking*, Vol. 04(01), pp. 1-16, 2015. DOI
5. Patrick Habecker, Kirk Dombrowski, and Bilal Khan. Improving the Network Scale-Up Estimator: Incorporating Means of Sums, Recursive Back Estimation, and Sampling Weights. *PLOS ONE*, Vol. 10(12), Article e0143406, 2015. DOI
6. Meredith Dank, Bilal Khan, Mitch Downey, Cybele Kotonias, Debbie Mayer, Colleen Owens, Laura Pacifici, and Lilly Yu. Estimating the Size and Structure of the Underground Commercial Sex Economy in Eight Major US Cities. *Report to the National Institute of Justice (NIJ)*, 2014, **412 pages**. link
7. Kirk Dombrowski, Bilal Khan, Joshua Moses, Emily Channell, and Evan Misshula. Assessing Respondent Driven Sampling for Network Studies in Ethnographic Contexts. *Advances in Anthropology*, Vol. 03(01), pp. 1-9, 2013. DOI
8. Kirk Dombrowski, Bilal Khan, Katherine McLean, Travis Wendel, Evan Misshula, S. Friedman, and Ric Curtis. A Reexamination of Connectivity Trends via Exponential Random Graph Modeling in Two IDU Risk Networks. *Substance Use & Misuse*, Vol. 48(14), pp. 1485-1497, 2013. DOI
9. Kirk Dombrowski, B. Khan, T. Wendel, K. McLean, and R. Curtis. Estimating the Size of the Methamphetamine- Using Population in New York City Using Network Sampling Techniques. *Advances in Applied Sociology*, Vol. 02(04), pp. 245-252, 2012. DOI
10. Alissa R. Ackerman and Bilal Khan. Assessing reporting patterns of child sexual abuse within the Catholic Church using discontinuities in model parameter timeseries. *Social Science Research*, Vol. 41(2), pp. 253-262, 2012.
11. Travis Wendel, Bilal Khan, Kirk Dombrowski, Ric Curtis, Katherine McLean, Evan Misshula, Robert Riggs, and David M. Marshall IV. Dynamics of Methamphetamine Markets in New York City. *Final Technical Report to the National Institute of Justice (NIJ)*, 2011, **268 pages**. link
12. R. Curtis, M. Dank, B. Khan, and K. Terry. The commercial sexual exploitation of children in New York City: The CSEC population in New York city: Size, characteristics, and needs. *Report to the Center for Court Innovation*, 2008, **125 pages**. link

Substance use & mental-health behavior studies ↑

13. Dennis E. McChargue, Bilal Khan, Jessica Phelps, Patrick Duryea, Kimberly A. Tyler, Arthur Andrews, Ellie Reznicek, Lucy Napper, Mohamed Saad, and Hsuan-Wei Lee. The feasibility of utilizing the open dynamic interaction network (ODIN) app to assess rEMA data across 30 days among those recovering from alcohol use disorders. *Drug and Alcohol Dependence Reports*, Vol. 14, Article 100305, 2025. DOI
14. Wenyue Wang, Dennis E. McChargue *, Bilal Khan, and Andrew P. Oakland. Behavioral, not self-reported, experiential avoidance predicts early treatment discontinuation at residential substance use treatment. *Frontiers in Psychiatry*, Vol. 17, Article 1725326, 2025. DOI
15. Anika Eisenbraun, Bilal Khan, Patrick Habecker, and Kimberly Tyler. A Feasibility and Acceptability Study Using Ecological Momentary Assessment to Evaluate Drug Use Patterns among Midwestern People Who

Use Drugs. *Journal of Drug Issues*, Vol. 55(3), pp. 420-433, 2024.

16. Haines, A.M., Duryea, P.R., McChargue, D.E., Khan, B., Andrews, A.R., and Tyler, K.A. The effect of PTSD symptom clusters on change in 12-Step affiliated practices among unhoused people recovering from alcohol use disorders. Poster at 12th Annual Collaborative Perspectives on Addiction (CPA), Denver, CO, 2024.
17. Jaffe, A.E., Ramirez, J.J., Wang, Y., Khan, B., and DiLillo, D. Individual variability in alcohol myopia and event- specific prediction of blackouts. Poster at 45th Annual Research Society on Alcoholism Scientific Meeting, June 2022.

Network modeling & simulation (epidemic and health systems) ↑

18. Sena Mursel, Brian D. Davison, Thomas McAndrew, Bilal Khan, and Paolo Bocchini. Spatiotemporal Dynamics of Avian Influenza: Understanding Avian Influenza Transmission via Mallard Migration Data. *Interdisciplinary Perspectives on Infectious Diseases*, Vol. 2025(1), Article 5555858, 2025. DOI
19. David Braun, Daniel Ingram, David Ingram, Bilal Khan, Jessecae Marsh, and Thomas McAndrew. Crowdsourced Perceptions of Human Behavior to Improve Computational Forecasts of US National Incident Cases of COVID-19: Survey Study. *JMIR Public Health and Surveillance*, Vol. 8(12), Article e39336, 2022. DOI
20. Elizabeth Stevens, Kimberly A. Nucifora, Holly Hagan, Ashly E. Jordan, Jennifer Uyei, Bilal Khan, Kirk Dombrowski, Don des Jarlais, and R. Scott Braithwaite. Cost-effectiveness of Direct Antiviral Agents for Hepatitis C Virus Infection and a Combined Intervention of Syringe Access and Medication-assisted Therapy for Opioid Use Disorders in an Injection Drug Use Population. *Clinical Infectious Diseases*, Vol. 70(12), pp. 2652-2662, 2019.
21. Bilal Khan, Ian Duncan, Mohamad Saad, Daniel Schaefer, Ashly Jordan, Daniel Smith, Alan Neaigus, Don Des Jarlais, Holly Hagan, and Kirk Dombrowski. Combination interventions for Hepatitis C and Cirrhosis reduction among people who inject drugs: An agent-based, networked population simulation experiment. *PLOS ONE*, Vol. 13(11), Article e0206356, 2018. DOI
22. Kirk Dombrowski, Bilal Khan, Patrick Habecker, Holly Hagan, Samuel R. Friedman, and Mohammed Saad. The Interaction of Risk Network Structures and Virus Natural History in the Non-spreading of HIV Among People Who Inject Drugs in the Early Stages of the Epidemic. *AIDS and Behavior*, Vol. 21(4), pp. 1004-1015, 2016.
23. Bilal Khan, Kirk Dombrowski, and Mohammad Saad. A stochastic agent-based model of pathogen propagation in dynamic multi-relational social networks. *SIMULATION*, Vol. 90(4), pp. 460-484, 2014. DOI
24. Bilal Khan, Kirk Dombrowski, Mohammad Saad, Katherine McLean, and Samuel R. Friedman. Network Firewall Dynamics and the Subsaturation Stabilization of HIV. *Discrete Dynamics in Nature and Society*, Vol. 2013, pp. 1-16, 2013. DOI
25. Mohamed Saad and Bilal Khan. Dynamic Optimization of Caregiver Schedules based on Vital Sign Streams. *E-Health Telecommunication Systems and Networks*, Vol. 02(02), pp. 36-47, 2013. DOI
26. Mohamed Saad, Bilal Khan, and Ghassen Ben Brahim. An Evaluation of the Risk Impact of Device Heterogeneity on Critical Care Delivery. *2013 5th International Conference on Modeling, Simulation and Applied Optimization (ICMSAO)*, Hammamet, Tunisia, April 28-30, 2013, pp. 1-6.
27. Mohsen Guizani, Ammar Rayes, Bilal Khan, and Ala Al-Fuqaha. Network Modeling and Simulation: A Practical Perspective. Wiley-Interscience, 2010, 304 pages. https://onlinelibrary.wiley.com/doi/book/10.1002/9780470515211

Social networks in Indigenous communities (Labrador, Alaska) ↑

28. Hsuan-Wei Lee, Miranda Melson, Jerreed Ivanich, Patrick Habecker, Robin Gauthier, Lisa Wexler, Bilal Khan, and Kirk Dombrowski. Mapping the Structure of Perceptions in Helping Networks of Alaska Natives. *PLOS ONE*, Vol. 13(11), Article e0204343, 2018. DOI
29. Joshua Moses, Bilal Khan, Vladimir Ponizovsky, G. Robin Gauthier, and Kirk Dombrowski. Confounding Culture: Drinking, Country Food Sharing and Traditional Knowledge Networks in a Labrador Inuit Community. *Human Organization*, Vol. 76(2), pp. 171-183, 2017.

30. Kirk Dombrowski, Patrick Habecker, G. Robin Gauthier, Joshua Moses, and Bilal Khan. Relocation Redux: Labrador Inuit population movements and inequalities in the land claims era. *Current Anthropology*, Vol. 57(6), pp. 785-805, 2016. DOI
31. K. Dombrowski, Bilal Khan, Joshua Moses, Emily Channell, and Ric Curtis. Network sampling of social divisions in a rural Inuit community. *Identities*, Vol. 21(2), pp. 134-151, 2014.
32. Kirk Dombrowski, B. Khan, E. Channell, J. Moses, K. McLean, and N. Dombrowski. Kinship, Family, and Exchange in a Labrador Inuit Community. *Arctic Anthropology*, Vol. 50(1), pp. 89-104, 2013.
33. Kirk Dombrowski, E. Channell, B. Khan, J. Moses, and E. Misshula. Out on the Land: Income, Subsistence Activities and Food Sharing Networks in Nain, Labrador. *Journal of Anthropology*, Vol. 2013, pp. 1-11, 2013. DOI
34. Kirk Dombrowski, Bilal Khan, Joshua Moses, Emily Channell, Katherine McLean, and Evan Misshula. The Nain Networks Project. *Report to the Nunatsiavut Research Committee, Nain, Labrador*, 2011, **194 pages**.

AI & language models for learning and text ↑

35. Bilal Khan. Beyond the Oracle: Prompt Engineering and the Architecture of AI Conversation. Amazon (self-published), 2025, 366 pages. https://www.amazon.com/Beyond-Oracle-Engineering-Architecture-Conversation/dp/B0FMP8SQJF
36. A Hayat, B Khan, and MR Hasan. BOARD# 288: NSF: IUSE Harnessing Language Models to Predict and Enhance STEM Engagement Using Non-Cognitive Experiential Data. *2025 ASEE Annual Conference & Exposition Proceedings*, 2025. DOI
37. Ahatsham Hayat, Sharif Wayne Akil, Helen Martinez, Bilal Khan, and Mohammad Rashedul Hasan. BOARD# 268:. Enhancing Zero-Shot Learning of Large Language Models for Early Forecasting of STEM Performance. *2024 ASEE Annual Conference & Exposition Proceedings*, 2024. DOI
38. Ahatsham Hayat, Bilal Khan, and Mohammad Rashedul Hasan. Leveraging Language Models for Analyzing Longitudinal Experiential Data in Education. *2024 International Conference on Machine Learning and Applications (ICMLA)*, 2024. link
39. Ahatsham Hayat, Bilal Khan, and Mohammad Rashedul Hasan. Improving Transfer Learning for Early Forecasting of Academic Performance by Contextualizing Language Models. *Proceedings of the 19th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2024)*, Mexico City, Mexico, June 20, 2024, pp. 137-148. link
40. Mohammad Rashedul Hasan and Bilal Khan. An AI-based intervention for improving undergraduate STEM learning. *PLOS ONE*, Vol. 18(7), Article e0288844, 2023. DOI
41. Mohammad Hasan and Bilal Khan. A Trajectory-Clustering Framework for Assessing AI-based Adaptive Interventions in Undergraduate STEM Learning. *2023 ASEE Annual Conference & Exposition Proceedings*, 2023.

HIV / HCV risk networks among people who inject drugs ↑

42. Elspeth Ready, Patrick Habecker, Roberto Abadie, Bilal Khan, and Kirk Dombrowski. Competing forces of withdrawal and disease avoidance in the risk networks of people who inject drugs. *PLOS ONE*, Vol. 15(6), Article e0235124, 2020. DOI
43. Ian Duncan, Patrick Habecker, Dane Hautala, Bilal Khan, and Kirk Dombrowski. Injection related Hepatitis C Serosorting Behaviors among People Who Inject Drugs: An Urban/Rural Comparison. *Journal of Ethnicity in Substance Abuse*, Vol. 18(4), pp. 578-593, 2019. DOI
44. Juan Carlos Reyes, Melissa Welch-Lazoritz, Laura Zayas Martinez, Bilal Khan, and Kirk Dombrowski. Prevalence and risk factors associated with homelessness among drug users in Puerto Rico. *Puerto Rico Health Sciences Journal*, Vol. 38(1), pp. 54-59, 2019. link
45. Patrick Habecker, Roberto Abadie, Melissa Welch-Lazoritz, Juan Carlos Reyes, Bilal Khan, and Kirk Dombrowski. Injection Partners HCV, and HIV Status among Rural Persons Who Inject Drugs in Puerto Rico. *Substance Use & Misuse*, Vol. 53(7), pp. 1128-1138, 2018. DOI

46. Ian Duncan, Roberto Abadie, Ric Curtis, Bilal Khan, and Kirk Dombrowski. Needle Acquisition Patterns, Network Risk and Social Capital among Rural PWID in Puerto Rico. *Harm Reduction Journal*, Vol. 14(1), Article 69, 2017. DOI
47. Roberto Abadie, Melissa Welch-Lazoritz, Bilal Khan, and Kirk Dombrowski. Social determinants of HIV/HCV co-infection: A case study from people who inject drugs in rural Puerto Rico. *Addictive Behaviors Reports*, Vol. 5, pp. 29-32, 2017. DOI
48. Dane Hautala, Roberto Abadie, Bilal Khan, and Kirk Dombrowski. Rural and urban comparisons of polysubstance use profiles and associated injection behaviors among people who inject drugs in Puerto Rico. *Drug and Alcohol Dependence*, Vol. 181, pp. 186-193, 2017. DOI
49. Courtney Thrash, Melissa Welch-Lazoritz, Robin Gauthier, Bilal Khan, Roberto Abadie, Yadira Rol n Col n, Sandra Miranda De Le n, and Kirk Dombrowski. Rural and urban injection drug use in Puerto Rico: Network implications for human immunodeficiency virus and hepatitis C virus infection. *Journal of Ethnicity in Substance Abuse*, Vol. 17(2), pp. 199-222, 2017. DOI
50. Kirk Dombrowski, Kelley Sittner, Devan Crawford, Melissa Welch-Lazoritz, Patrick Habecker, and Bilal Khan. Network approaches to substance use and HIV/Hepatitis C risk among homeless youth and adult women in the United States: A Review. *Health*, Vol. 08(12), pp. 1143-1165, 2016. DOI
51. Kirk Dombrowski, Devan Crawford, Bilal Khan, and Kimberly Tyler. Current Rural Drug Use in the US Midwest. *Journal of Drug Abuse*, Vol. 2(3), Article 22, 2016. DOI
52. H. Hagan, J. Nuerer, A. E. Jordan, D. C. Des Jarlais, J. Wu, K. Dombrowski, B. Khan, S. Braithwaite, and J. Kessler. Hepatitis C. Virus Incidence among HIV+ Men Who Have Sex with Men: The Role of Non-Injection Drug Use. *Drug and Alcohol Dependence*, Vol. 146, Article e133, 2015.
53. Holly Hagan, Joshua Neuer, Ashly E Jordan, Don C Des Jarlais, Jennifer Wu, Kirk Dombrowski, Bilal Khan, R Scott Braithwaite, and Jason Kessler. Hepatitis C virus infection among HIV-positive men who have sex with men: Protocol for a systematic review and meta-analysis. *Systematic Reviews*, Vol. 3(1), Article 31, 2014. DOI
54. Kirk Dombrowski, Ric Curtis, Samuel R. Friedman, and Bilal Khan. Topological and Historical Considerations for Infectious Disease Transmission among Injecting Drug Users in Bushwick, Brooklyn (USA). *World Journal of AIDS*, Vol. 03(01), pp. 1-9, 2013. DOI
55. Bilal Khan, Kirk Dombrowski, Mohamed Saad, Katherine McLean, Evan Misshula, Ric Curtis, Travis Wendel, and William Jett. IDU Network Topologies and HIV Stabilization Dynamics. *Final Report, NIH/NIDA Challenge Grant 1RC1DA028476-01/02*, 2011, **244 pages**.

Data science & machine learning for behavior data ↑

56. Ahatsham Hayat, Bilal Khan, and Mohammad Rashedul Hasan. ConText-LE: Cross-Distribution Generalization for Longitudinal Experiential Data via Narrative-Based LLM Representations. *Findings of the Association for Computational Linguistics: EMNLP 2025*, 2025, pp. 15335-15360. DOI
57. Nguyen T Thach, Patrick Habecker, Anika R Eisenbraun, W Alex Mason, Kimberly A Tyler, Bilal Khan, and Hau Chan. MuHBoost: Multi-Label Boosting For Practical Longitudinal Human Behavior Modeling. *The Thirteenth International Conference on Learning Representations (ICLR 2025)*, 2025. link
58. Nguyen Thach, Patrick Habecker, Bergen Johnston, Lillianna Cervantes, Anika Eisenbraun, Alex Mason, Kimberly Tyler, Bilal Khan, and Hau Chan. A Novel GAN Approach to Augment Limited Tabular Data for Short-Term Substance Use Prediction. *Proceedings of the Thirty-ThirdInternational Joint Conference on Artificial Intelligence*, 2024, pp. 7474-7482. DOI
59. Nguyen Thach, Patrick Habecker, Bergen Johnston, Lillianna Cervantes, Anika Eisenbraun, Alex Mason, Kimberly Tyler, Bilal Khan, and Hau Chan. Analyzing and Predicting Short-Term Substance Use Behaviors of Persons Who Use Drugs in the Great Plains of the U.S. *PLOS ONE*, Vol. 19(11), Article e0312046, 2024. DOI
60. Bilal Khan, Kirk Dombrowski, Alekhya Bellam, Gisela Font Sayeras, Kin Pi, Devan Crawford, Patrick Habecker, and Maisha Jauernig. Towards a Smart(er) Social Science using high-dimensional continuous-time trajectories from the Open Dynamic Interaction Networks (ODIN) platform. *2019 IEEE Smart-*

World, Ubiquitous Intelligence & Computing, Advanced & Trusted Computing, Scalable Computing & Communications, Cloud & Big Data Computing, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/CBDCom/IOP/SCI), Leicester, 2019, pp. 37-44.

FOUNDATIONS ↑

Combinatorial group theory & cryptography ↑

61. Bilal Khan. Uniform Hyperbolicity of Automorphism Orbit Graphs in Rank Two. *arXiv submission (on hold, not yet announced); primary category math.GR*, 2026.
62. Bilal Khan, Alexei Miasnikov, and Denis Serbin. On positive theories of groups with regular free length functions. *International Journal of Algebra and Computation*, Vol. 17(01), pp. 1-26, 2007. DOI
63. Delaram Kahrobaei and Bilal Khan. A Non-Commutative Generalization of ElGamal Key Exchange using Polycyclic Groups. *IEEE Globecom 2006*, San Francisco, CA, Nov 27-Dec 1, 2006, pp. 1-5. DOI
64. Bilal Khan. The Structure of Automorphic Conjugacy in the Free Group of Rank Two. *Contemporary Mathematics*, Vol. 349, pp. 115-196, 2003. DOI
65. Bilal Khan. Positively Generated Subgroups of Free Groups and the Hanna Neumann Conjecture. *Contemporary Mathematics*, Vol. 296, pp. 155-170, 2002. DOI

Graph theory, combinatorics & graph arithmetic ↑

66. Bilal Khan and Kiran Bhutani. Additive Operations on Flow Graphs. *AKCE International Journal of Graphs and Combinatorics*, Vol. 11(2), 2014.
67. Bilal Khan and Kiran Bhutani. Compression and Expansion in Graphs using Overlays. *Networks*, Vol. 58(1), pp. 36-42, 2011. DOI
68. Bilal Khan and Kiran Bhutani. Sparse Periodic Goldbach Sets. *Proceedings of The Third International Conference on Mathematical Sciences*, Dubai, UAE, 2008.
69. Bilal Khan and Kiran Bhutani. Graphic Arithmetic II: +Irreducibility, Canonical Decompositions and Cancellation Laws. *Proceedings of The Third International Conference on Mathematical Sciences*, Dubai, UAE, 2008.
70. Bilal Khan and Kiran Bhutani. Designing scalable networks with multiple personalities. *Proceedings of The Third International Conference on Mathematical Sciences*, Dubai, UAE, 2008.
71. Bilal Khan, Kiran Bhutani, and Delaram Kahrobaei. A Graphic Generalization of Arithmetic. *INTEGERS: Electronic Journal of Combinatorial Number Theory*, Vol. 7(A12), 2007. link
72. Kiran Bhutani and Bilal Khan. Distance Between Graphs Using Graph Labelings. *Ars Combinatoria*, Vol. 77, pp. 45-52, 2005. link
73. Bilal Khan. Computation with Polytopal Uncertainty in d-Dimensional Euclidean Space. *Proceedings of the 9th World Multi-Conference on Systemics, Cybernetics and Informatics (WMSCI)*, Florida, USA, 2005.
74. Kiran Bhutani and Bilal Khan. A metric on the set of connected simple graphs of given order. *Aequationes Mathematicae*, Vol. 66(3), pp. 232-240, 2003. DOI

Other mathematics & physics (music metrics, cellular automata, Casimir) ↑

75. Irshadullah Khan and Bilal Khan. A Maxwell Quadratic-Form Representation of the Parallel-Plate Casimir Trace from Codimension-Three Riesz Reduction. *arXiv preprint arXiv:2605.20230 [math.GM]*, 2026. link
76. Irshadullah Khan and Bilal Khan. A Quadratic-Form Representation of the Scalar Casimir Trace from Codimension-Three Riesz Reduction. *arXiv preprint arXiv:2605.06693 [math.GM]*, 2026. link
77. Bilal Khan, Y. Cantor, and Kirk Dombrowski. Attractor-Based Obstructions to Growth in Homogeneous Cyclic Boolean Automata. *Journal of Computer Science & Systems Biology*, Vol. 08(06), pp. 341-353, 2015. DOI
78. Y. Cantor, Bilal Khan, and K. Dombrowski. Towards a Formal Understanding of Bateson's Rule: Chromatic Symmetry in Cyclic Boolean Networks and its Relationship to Organism Growth and Cell Differen-

tiation. *Procedia Computer Science*, Vol. 36, pp. 476-483, 2014. DOI

79. Yuri Cantor, Bilal Khan, and Kirk Dombrowski. Heterogeneity and its Impact on Thermal Robustness and Attractor Density. *Procedia Computer Science*, Vol. 6, pp. 15-21, 2011. DOI
80. Richard Randall and Bilal Khan. Lerdahl's tonal pitch space model and associated metric spaces. *Journal of Mathematics and Music*, Vol. 4(3), pp. 121-131, 2010.
81. Richard Randall and Bilal Khan. Similarity Measures for Tonal Models. *Proceedings of the 9th International Conference on Music Perception and Cognition*, Bologna, Italy, 2006.

COMMUNICATIONS & SECURITY ↑

ATM / PNNI routing & signaling ↑

82. A. Battou, B. Khan, D. C. Lee, S. Marsh, S. Mountcastle, and D. Talmage. SEAN for modeling and simulating ATM Signaling. *SIMULATION*, Vol. 78(4), pp. 231-238, 2002. DOI
83. Bilal Khan, David Talmage, Sean Mountcastle, Abdella Battou, and Spencer Marsh. Introducing PRouST: The PNNI Routing and Simulation Toolkit. *2001 IEEE Workshop on High Performance Switching and Routing (IEEE Cat. No.01TH8552)*, Dallas, TX, May 29-31 May, 2001, pp. 335-341. DOI
84. Abdella Battou, Bilal Khan, Daniel Lee, Spencer Marsh, Sean Mountcastle, and David Talmage. Introducing SEAN: Signaling Entity for ATM networks. *Globecom '00 - IEEE. Global Telecommunications Conference. Conference Record (Cat. No.00CH37137)*, San Francisco, CA, Nov 27-Dec 1, 2000, pp. 532-537. DOI
85. Abdella Battou, Kiran Bhutani, and Bilal Khan. Two Approaches for Aggregation of Peer Group Topology in Hierarchical PNNI Networks. *Intelligent Automation & Soft Computing*, Vol. 6(2), pp. 125-134, 2000. DOI
86. Abdella Battou, Bilal Khan, and Sean Mountcastle. PNNI and the Optimal Design of High-speed ATM Networks. *Informatica (Ljubljana)*, Vol. 23(3), pp. 359-367, 1999. link
87. Baruch Awerbuch, Yi Du, Bilal Khan, and Yuval Shavitt. Routing Through Networks with Hierarchical Topology Aggregation. *Journal of High Speed Networks*, Vol. 7(1), pp. 57-73, 1998. DOI

Mobile ad hoc & wireless networks ↑

88. Bilal Khan and Zeki Bilgin. Performance comparison of two route optimisation schemes for AODV in MANETs. *International Journal of Communication Networks and Distributed Systems*, Vol. 17(1), pp. 76-102, 2016.
89. Zeki Bilgin and Bilal Khan. Dynamic power budget distribution schemes that optimise connection lifetimes in MANETs. *International Journal of Autonomous and Adaptive Communications Systems*, Vol. 5(4), pp. 360-385, 2010. DOI
90. Zeki Bilgin and Bilal Khan. A Dynamic Route Optimization Mechanism for AODV in MANET. *2010 IEEE International Conference on Communications*, Capetown, South Africa, May 23-27, 2010, pp. 1-5. DOI
91. Zeki Bilgin and Bilal Khan. Using Connection Expansion to Reduce Control Traffic in MANETs. *Proceedings of the 6th International Wireless Communications and Mobile Computing Conference*, Caen, France, June 28 - July 2, 2010, pp. 534-538. DOI
92. Zeki Bilgin and Bilal Khan. Only the Short Die Old: Route Optimization in MANETs by Dynamic Subconnection Shrinking. *Proceedings of the 6th International Wireless Communications and Mobile Computing Conference*, Caen, France, June 28 - July 2, 2010, pp. 681-685. DOI
93. Zeki Bilgin and Bilal Khan. Having one's cake and eating it too: Better routes and lower control traffic for AODV. *2010 The 9th IFIP Annual Mediterranean Ad Hoc Networking Workshop (Med-Hoc-Net)*, Juan-Les-Pins, France, June 23-25, 2010, pp. 1-8. DOI
94. Zeki Bilgin and Bilal Khan. Balancing Power: Tradeoffs between Connection Lifetime and Control Traffic Overhead in MANETS. *Proceedings of the 2009 International Conference on Wireless Communications and Mobile Computing: Connecting the World Wirelessly*, Leipzig, Germany, June 21- 24, 2009, pp. 883-887. DOI

95. Carol Dottin and Bilal Khan. Scheduling Cooperative Emergency Response (or how the Meek shall overcome the Greedy). *Proceedings of the 2009 International Conference on Wireless Communications and Mobile Computing: Connecting the World Wirelessly*, Leipzig, Germany, 2009, pp. 598-602. DOI
96. Ghassen Ben Brahim, A. Al-Fuquaha, M. Guizani, and B. Khan. A Model for Cooperative Mobility and Budgeted QoS in MANETs with Heterogenous Autonomy Requirements. *IEEE GLOBECOM 2008 - 2008 IEEE Global Telecommunications Conference*, New Orleans, LO, Nov 30-Dec 4, 2008, pp. 1-5. DOI
97. Zeki Bilgin and Bilal Khan. Increasing Connection Lifetimes through Dynamic Distribution of Budgeted Power. *2008 International Wireless Communications and Mobile Computing Conference*, Crete Island, Greece, August 6th - 8th, 2008, pp. 500-504. DOI
98. A. Al-Fuqaha, B. Khan, M. Guizani, A. Rayes, O. Awwad, and G. Ben Brahim. Opportunistic Channel Selection Strategy for Better QoS in Cooperative Networks with Cognitive Radio Capabilities. *IEEE Journal on Selected Areas in Communications*, Vol. 26(1), pp. 156-167, 2008.
99. Ghassen Ben Brahim, Bilal Khan, Ala Al-Fuqaha, Mohsen Guizani, and Dionysios Kountanis. Surrendering Autonomy: Can Cooperative Mobility Help?. *Euro-Par 2007 Parallel Processing (Lecture Notes in Computer Science)*, Rennes, France, August 28-31, 2007, pp. 901-910. DOI
100. G. Ben Brahim, O. Awaad, A. Al-Fuquaha, B. Khan, and M. Guizani. Using MILP for Optimal Movement Planning in MANETs with Cooperative Mobility. *IEEE GLOBECOM 2007-2007 IEEE Global Telecommunications Conference*, Washington, DC, Nov 26-30, 2007, pp. 1201-1205.
101. Ghassen Ben Brahim, Ala Al-Fuqaha, D. Kountanis, and Bilal Khan. A New Fuzzy-Based Cooperative Movement Model in Support of QoS in Wireless Ad-Hoc Networks. *Proceedings of the 2007 international conference on Wireless communications and mobile computing*, Honolulu, Hawaii, August 12-16, 2007, pp. 158-163.
102. Bilal Khan, Ghassen Ben Brahim, and Ala Al-Fuqaha. Multigrid Techniques for Movement Planning in MANETs with Cooperative Mobility. *Proceedings of the 2007 international conference on Wireless communications and mobile computing*, Honolulu, Hawaii, August 12-16, 2007, pp. 197-201.
103. Ghassen Ben Brahim, Bilal Khan, Ala Al-Fuqaha, and Mohsen Guizani. Weak many vs. strong few: reducing BER through packet duplication in power-budgeted wireless connections. *International Journal of Sensor Networks*, Vol. 4(3), pp. 145-154, 2006. DOI
104. Bilal Khan and Ghassen Ben Brahim. Budgeting Power: Packet Duplication and Bit Error Rate Reduction in Wireless Ad-Hoc Networks. *Proceedings of the 2006 international conference on Wireless communications and mobile computing*, Vancouver, Canada, July 3-6, 2006, pp. 293-298. DOI
105. Bilal Khan, Ghassen Ben Brahim, Ala Al-Fuqaha, and Mohsen Guizani. Using Energy-Efficient Overlays to Reduce Packet Error Rates in Wireless Ad-Hoc Networks. *2006 IEEE International Conference on Communications*, Istanbul, Turkey, June 11-15, 2006, pp. 3717-3722. DOI
106. Bilal Khan, Ghassen Ben Brahim, Ala Al-Fuqaha, and Mohsen Guizani. Harnessing the Parity of Multiple Errors in End-to-End MAC Schemes. *IEEE Globecom 2006*, San Fancisco, CA, Nov 27-Dec 1, 2006, pp. 1-5. DOI
107. Bilal Khan, Ghassen Ben Brahim, Ala Al-Fuqaha, and Mohsen Guizani. Minimizing Wireless Connection BER through the Dynamic Distribution of Budgeted Power. *IEEE Globecom 2006*, San Francisco, CA, Nov 27-Dec 1, 2006, pp. 1-5. DOI

Network simulation toolkits (CASiNO, SEAN, PRouST, CHIME) ↑

108. A. Battou, B. Khan, D. C. Lee, S. Mountcastle, D. Talmage, and S. Marsh. CASiNO: component architecture for simulating network objects. *Software: Practice and Experience*, Vol. 32(11), pp. 1099-1128, 2002. DOI
109. Bilal Khan, Dardo D. Kleiner, and David Talmage. CHIME: The Cellular Hierarchy Information Modeling Environment. *Proceedings of the International Conference on Parallel and Distributed Computing and Systems (PDCS 2000)*, Las Vegas, Nevada, November 6-9, 2000. link
110. A. Battou, B. Khan, D. Lee, S. Marsh, S. Mountcastle, and D. Talmage. CASiNO: A Component Architecture for Simulation of Network Objects. *Proceedings of the Symposium on Performance Evaluation*

of Computer and Telecommunication Systems, Chicago, IL, Oct 24-28, 1999, pp. 261-272.

Network security, forensics & malware ↑

111. Jeremy Seideman, Bilal Khan, and Cesar Vargas. Quantifying Malware Evolution through Archaeology. *Journal of Information Security*, Vol. 06(02), pp. 101-110, 2015. DOI
112. Jeremy D. Seideman, Bilal Khan, and Antonio Cesar Vargas. Malware Biodiversity Using Static Analysis. *Future Network Systems and Security (FNSS 2015); Communications in Computer and Information Science*, 2015, pp. 139-155.
113. Jeremy D. Seideman, Bilal Khan, and Antonio Cesar Vargas. Identifying Malware Genera using the Jensen-Shannon Distance Between System Call Traces. *2014 9th International Conference on Malicious and Unwanted Software: The Americas (MALWARE)*, Fajardo, Puerto Rico, October 28-30, 2014, pp. 1-7.
114. Jeremy Seideman, Bilal Khan, and Ghassen Ben Brahim. Determining vulnerability resolution time by examining malware proliferation rates. *2013 9th International Wireless Communications and Mobile Computing Conference (IWCMC)*, Sardinia, July 1-5, 2013, pp. 1678-1682.
115. Omer Demir, Bilal Khan, Ala Al-Fuqaha, and Ghassen Ben Brahim. Optimizing Agent Placement for Flow Reconstruction of DDoS Attacks. *2013 9th International Wireless Communications and Mobile Computing Conference (IWCMC)*, Sardinia, July 1-5, 2013, pp. 83-89. DOI
116. Omer Demir and Bilal Khan. Finding DDoS attack sources: Searchlight localization algorithm for network tomography. *2011 7th International Wireless Communications and Mobile Computing Conference*, Istanbul, Turkey, July 4-8 , 2011, pp. 418-423.
117. Yuri Cantor, Nancy Griffeth, and Bilal Khan. Securing BGP Through Existing Infrastructure and Contractual Chains. *Proceedings of the Computers, Freedom, and Privacy conference*, San Jose, CA, June 15-18, 2010. link
118. Omer Demir and Bilal Khan. Reconstruction of Malicious Internet Flows. *Proceedings of the 6th International Wireless Communications and Mobile Computing Conference*, Caen, France, June 28 - July 2, 2010, pp. 1182-1187. DOI
119. Omer Demir and Bilal Khan. Quantifying Distributed System Stability through Simulation: A Case Study of an Agent-Based System for Flow Reconstruction of DDoS Attacks. *2010 International Conference on Intelligent Systems, Modelling and Simulation*, Liverpool, UK, Jan 27-29, 2010, pp. 312-317. DOI
120. Jaroslaw Paduch, Jamie Levy, and Bilal Khan. Using a Secure Permutational Covert Channel to Detect Local and Wide Area Interposition Attacks. *Proceedings of the 2009 International Conference on Wireless Communications and Mobile Computing: Connecting the World Wirelessly*, Leipzig, Germany, June 21-24, 2009, pp. 79-83. DOI
121. Jamie Levy, Jaroslaw Paduch, and Bilal Khan. Superimposing Permutational Covert Channels onto Reliable Stream Protocols. *2008 3rd International Conference on Malicious and Unwanted Software (MALWARE)*, Oct 7-8, 2008, pp. 49-56. DOI
122. Joel Sandin and Bilal Khan. Petrifying Worm Cultures: Scalable Detection and Immunization in Untrusted Environments. *2007 IEEE International Conference on Communications*, Glasgow, Scotland, June 24,-28, 2007, pp. 1423-1428. DOI
123. Jamie Levy and Bilal Khan. Hiding Your Wares: Transparently Retrofitting Memory Confidentiality into Legacy Applications. *2007 IEEE International Conference on Communications*, Glasgow, Scotland, June 24-28 , 2007, pp. 1368-1372. DOI

Optical (WDM) network routing ↑

124. Bilal Khan, Dardo D. Kleiner, David Talmage, and Abdella Battou. The Effect of Wavelength Advertisement on the Performance of an Optical Routing Protocol. *IEEE Global Telecommunications Conference, 2004. GLOBECOM '04.*, Dallas, TX, Nov 29 -Dec 3, 2004, pp. 1985-1988. DOI
125. Abdella Battou, Ghassen Ben Brahim, and Bilal Khan. The Optical Network Control Plane. In *Optical Switching/Networking and Computing for Multimedia Systems*, edited by Abdella Battou; Mohsen Guizani,

Marcel Dekker / CRC Press, 2002, pp. 133-178. DOI

126. G. Ben Brahim, B. Khan, A. Battou, M. Guizani, and G. Chaudhry. TRON: The Toolkit for Routing in Optical Networks. *GLOBECOM'01. IEEE Global Telecommunications Conference (Cat. No.01CH37270)*, San Antonio, TX, Nov 25-29, 2001, pp. 1445-1449. DOI

127. G. Ben Brahim, B. Khan, A. Battou, M. Guizani, and G. Chaudhry. Routing Protocols for Optical Networks. *Proceedings of IEEE Globecom*, San Francisco, CA, 2000.

Hybrid RF / free-space-optical networks ↑

128. M. Ahmad, Ala Al-Fuqaha, Osama Awwad, and Bilal Khan. Synergies of Radio Frequency and Free Space Optics Communication: New Hybrid Solutions for Next Generation Wireless Mesh Networks. *International Journal of Computer Networks (IJCN)*, Vol. 4(5), 2012.

129. O. Awwad, Ala Al-Fuqaha, Bilal Khan, and G. B. Brahim. Topology Control Schema for Better QoS in Hybrid RF/FSO Mesh Networks. *IEEE Transactions on Communications*, Vol. 60(5), pp. 1398-1406, 2012. DOI

130. Osama Awwad, Ala Al-Fuqaha, Ghassen Ben Brahim, Bilal Khan, and Ammar Rayes. Distributed Topology Control in Large-Scale Hybrid RF/FSO Networks: SIMT GPU-Based Particle Swarm Optimization Approach. *International Journal of Communication Systems*, Vol. 26(7), pp. 888-911, 2011.

131. O. Awwad, A. Al-Fuqaha, B. Khan, D. Benhaddou, M. Guizani, and A. Rayes. Bayesian-Based Game Theoretic Model to Guarantee Cooperativeness in Hybrid RF/FSO Mesh Networks. *GLOBECOM 2009 - 2009 IEEE Global Telecommunications Conference*, Honolulu, Hawaii, Nov 30-Dec 4, 2009, pp. 1-7.

Agent-based network management & multi-agent systems ↑

132. Hesham Abed, Ala Al-Fuqaha, Bilal Khan, and Ammar Rayes. Efficient Failure Prediction in Autonomic Networks Based on Trend and Frequency Analysis of Anomalous Patterns. *International Journal of Network Management*, Vol. 23(3), pp. 186-213, 2013.

133. Bilal Khan, Dardo D. Kleiner, and David Talmage. The Buck Stops Here: Trust Management in Multi-Agent Systems with Accountability. *IEEE First Symposium on Multi-Agent Security and Survivability*, Philadelphia, Pennsylvania, August 30-31, 2004, pp. 46-54. DOI

134. Kiran Bhutani and Bilal Khan. Optimal distribution of a hierarchy of network management agents. *Information Sciences*, Vol. 149(4), pp. 235-248, 2003. DOI

135. Kiran Bhutani, Bilal Khan, and Birendro Roy. Tradeoffs in Load Balancing and Communication Minimization for Multi- Agent Systems. *Proceedings of International Conference on Parallel and Distributed Computing and Systems*, Cambridge, Massachusetts (MIT), November 4 – 6, 2002, pp. 363-368.

136. Kiran R. Bhutani and Bilal Khan. Minimizing Communication Costs in Hierarchical Multi-Agent Systems. *Proceedings of The Joint Conference on Information Sciences JCIS*, Chapel Hill, North Carolina, 2002, pp. 1435-1442. link

137. Bilal Khan, Dardo D. Kleiner, and David Talmage. OPTIPRISM: A Distributed Hierarchical Network Management System for All-Optical Networks. *GLOBECOM'01. IEEE Global Telecommunications Conference (Cat. No.01CH37270)*, San Antonio, Texas, Nov 25-29, 2001, pp. 1531-1535. DOI

138. Bilal Khan, Dardo D. Kleiner, and D. Talmage. Towards an Agent-based Distributed Hierarchical Network Management System for All-Optical Networks. *Mobile Agents for Telecommunication Applications, MATA 2001 (Lecture Notes in Computer Science)*, San Antonio, Texas, 2000, pp. 103-113. DOI

Cognitive radio & bio-social spectrum access ↑

139. Anna Wisniewska, Nirnimesh Ghose, and Bilal Khan. Evaluation of a bio-socially inspired secure DSA scheme using testbed-calibrated hybrid simulations. *2021 IEEE 12th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON)*, 2021, pp. 0934-0939.

140. Anna Wisniewska, Mohammad Abu Shattal, Bilal Khan, Ala Al-Fuqaha, and Kirk Dombrowski. Emergence of pecking order in social Cognitive Radio societies. *IEEE INFOCOM 2018 - IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)*, 2018, pp. 305-311.

141. Mohammad Abu Shattal, Anna Wisniewska, Bilal Khan, Ala Al-Fuqaha, and Kirk Dombrowski. From Channel Selection to Strategy Selection: Enhancing VANETs using Socially-Inspired Foraging and Deference Strategies. *IEEE Transactions on Vehicular Technology*, Vol. 67(9), pp. 8919-8933, 2018.
142. Anna Wisniewska, Bilal Khan, Ala Al-Fuqaha, Kirk Dombrowski, and Mohammad Abu Shattal. When Brands fight over Bands: Sociality in the Cognitive Radio Ecosystem. *2017 IEEE International Conference on Communications (ICC)*, 2017, pp. 1-6.
143. Anna Wisniewska, Mohammad Abu, Bilal Khan, Ala Al-Fuqaha, and Kirk Dombrowski. From Blindness to Foraging to Sensing to Sociality: An Evolutionary Perspective on Cognitive Radio Networks. *Mobile Networks and Applications*, Vol. 25(5), pp. 1902-1914, 2017.
144. M. Abu Shattal, A. Wisniewska, Ala Al-Fuqaha, Bilal Khan, and K. Dombrowski. Evolutionary Game Theory Perspective on Dynamic Spectrum Access Etiquette. *IEEE Access*, Vol. 6, pp. 13142-13157, 2017. DOI
145. Mohammad Abu Shattal, Ala Al-Fuqaha, Bilal Khan, Kirk Dombrowski, and Anna Wisniewska. Evolution of Bio-Socially Inspired Strategies in Support of Dynamic Spectrum Access. *2017 IEEE International Conference on Communications Workshops (ICC Workshops)*, 2017, pp. 289-295.
146. Anna Wisniewska, Bilal Khan, Ala Al-Fuqaha, Kirk Dombrowski, and Mohammad Abu Shattal. Social deference and hunger as mechanisms for starvation avoidance in cognitive radio societies. *2016 International Wireless Communications and Mobile Computing Conference (IWCMC)*, 2016, pp. 1063-1068.
147. Anna Wisniewska and Bilal Khan. Contention-sensing and Dynamic Spectrum Co-use in Secondary User Cognitive Radio Societies. *2014 International Wireless Communications and Mobile Computing Conference (IWCMC)*, Nicosia, Cyprus, Aug 4-8, 2014, pp. 157-162.

MEMBERSHIPS AND AFFILIATIONS

- Associate Editor of Int. Journal of Computer Mathematics: Computer Systems Theory, 2019–present
- Steering Committee of EAI International Conference on Bio-inspired Information and Communications Technologies, 2018–2020
- American Sociological Association
- American Anthropological Association
- International Network for Social Network Analysis
- American Mathematical Society
- Society for Industrial & Applied Mathematics
- Association for Computing Machinery
- Institute of Electrical & Electronics Engineers

RESEARCH GRANTS SUMMARY ↑

Research Grant Status	Number	Total $
Funded awards in progress	4	$10.7M
Funded projects completed	24	$33.5M

Funding Agency	Awards
National Institutes of Health	15
National Science Foundation	8
National Institute of Justice	2
National Security Agency	2
Office of Juvenile Justice and Delinquency Prevention	1

FUNDING AGENCY PANEL MEMBERSHIPS

- NIH CDMA (Clinical Data Management and Analysis Panel member), 2020–2024
- NIH BCHI (Biomedical Computing & Health Informatics Panel member), 2018–2020
- NSF MMS (Methodology, Measurement and Statistics, Ad-hoc reviewer), 2018
- NSF BCC-SBE (Building Community and Capacity for Data-Intensive Research in the Social, Behavioral, and Economic Sciences), 2014–2015

FUNDED AWARDS IN PROGRESS ($10.7M)

1. Aug 2025–Apr 2030, co-I (PI Brock), "Impact of the Early Family Emotional Climate on Preschooler Emotion Dysregulation" **National Institutes of Health**, Eunice Kennedy Shriver National Institute of Child Health and Human Development R01HD115717 ($2.9M)
2. Aug 2022–Jun 2027, co-I (PI Tyler), "Street Experiences, Affect, and Coping: Harnessing Computational Models for the Development of a Cellphone-Based Intervention to Prevent Drug Use among Youth Experiencing Homelessness" **National Institutes of Health**, National Institute on Drug Abuse R01DA054969 ($3.6M)
3. Jun 2022–May 2027, co-PI (PI Hassan [Hasan]), "Using Artificial Intelligence to Generate Interventions for Enhancing Student Performance in College STEM Courses" **National Science Foundation**, STEM Education (IUSE; formerly DUE) NSF DUE 2142558 ($599,000)
4. Mar 2022–Jun 2027, co-I (PI Andrews), "Allostatic load, stress Response to Social Stress, frequency of Stress Exposure, and social Network structure/function (ARSEN)" **National Institutes of Health**, National Institute on Minority Health and Health Disparities R01MD015905 ($3.6M)

FUNDED PROJECTS COMPLETED ($33.5M)

1. Sep 2022–Aug 2025, co-I (PI Jaffe), "Connecting Alcohol Myopia to Real-World Risk Behaviors through Cognitive Ecological Momentary Assessment" **National Institutes of Health**, National Institute on Alcohol Abuse and Alcoholism R21AA029489 ($443,154)
2. Aug 2022–Apr 2025, co-I (PI Jagota), "PIPP Phase I: Dynamics of Pandemic Spread and Prevention in

Indigenous Communities" **National Science Foundation**, Pandemic Prevention (PIPP) NSF 2200066 ($999,894)

3. May 2021–Apr 2024, PI (co-PI McChargue), "Mapping the co-evolution of Craving, Affect, Stressors, and Access to Alcohol (CASA) using responsive EMA" **National Institutes of Health**, National Institute on Alcohol Abuse and Alcoholism R21AA029231 ($408,187)
4. Jun 2019–Feb 2026, co-I (with C. Wood, UNL), "Biomarkers for Dysbiosis-Related HIV-Associated Cognitive Disorders among Persons Who Inject Drugs in Puerto Rico" **National Institutes of Health**, National Institute on Drug Abuse R01DA047823 ($2.5M)
5. Apr 2019–Mar 2024, co-I and co-Director of the Longitudinal Networks Core, "Rural Drug Addiction Research Center" **National Institutes of Health**, National Institute of General Medical Sciences P20GM130461 ($11.9M)
6. Sep 2018–Aug 2021, co-I (PI Abadie), "Assessing the effects of hurricane Maria on Opioid Agonist Treatment access among PWID in rural Puerto Rico" **National Institutes of Health**, National Institute on Drug Abuse R21DA047304 ($412,763)
7. Sep 2018–Jul 2024, Co-I (PI Julia McQuillan, UNL), "Worlds of Connections: Engaging Youth with Health Research through Network Science and Stories in Augmented Reality" **National Institutes of Health**, National Institute of General Medical Sciences R25GM129836 ($1.3M)
8. Jun 2018–Sep 2024, co-I (with Lisa Wexler, UMass), "Promoting Community Conversations about Research to end Native Youth Suicide in Rural Alaska" **National Institutes of Health**, National Institute of Mental Health R01MH112458 ($3.4M)
9. Apr 2018–Mar 2022, Co-I (PI K. Dombrowski), "REU Site: Social Network Analysis for Solving Minority Health Disparities" **National Science Foundation**, SBE/SMA REU Sites NSF SMA-1757739 ($215,946)
10. May 2016–Apr 2020, Principal Investigator (with co-PI K. Dombrowski), "Measuring Social Behavior via Dynamic Network Interaction" **National Institutes of Health**, National Institute of General Medical Sciences R01GM118427 ($1.2M)
11. Feb 2015–Jan 2018, co-Investigator, "REU Site: Social Network Analysis for Solving Minority Health Disparities" **National Science Foundation**, SBE/SMA REU Sites NSF SMA-1461132 ($349,996)
12. Sep 2014–Aug 2016, Principal Investigator (with co-PI K. Dombrowski), "Collaborative Research: Applying Behavioral-Ecological Network Models to Enhance Distributed Spectrum Access in Cognitive Radio" **National Science Foundation**, Enhancing Access to the Radio Spectrum (EARS) NSF AST-1443985 ($499,986)
13. Aug 2014–Jul 2020, Principal Investigator (with co-PI K. Dombrowski and J.C. Reyes), "Injection Risk Networks in Rural Puerto Rico" **National Institutes of Health**, National Institute on Drug Abuse R01DA037117 ($3.2M)
14. Aug 2014–Jul 2020, co-PI (with Dombrowski), "Injection Risk Networks in Rural Puerto Rico (competing supplement)" **National Institutes of Health**, National Institute on Drug Abuse R01DA037117-05S1 ($241,122)
15. Sep 2013–Feb 2016, Principal Investigator, "Towards A Cellphone-Based Infrastructure For Harvesting Dynamic Interaction Network Data" **National Science Foundation**, Office of Multidisciplinary Activities (SMA) NSF SMA-1338485 ($249,780)
16. Jul 2013–Apr 2018, co-Investigator (PI H Hagan, NYU, co-I K Dombrowski), "Addressing Hepatitis C and Hepatocellular Carcinoma: Current and Future Epidemics" **National Institutes of Health**, National Institute on Drug Abuse R01DA034637 ($2.5M)
17. Jan 2011–Jan 2013, co-PI (with M Dank), "Estimating the Unlawful Commercial Sex Economy in the United States" **National Institute of Justice**, NIJ FY10 Research and Evaluation on Human Trafficking 2010-IJ-CX-1674 ($499,036)
18. Oct 2009–Mar 2012, co-I (Michael Rempel, PI), "Research on the Commercial Sexual Exploitation of Children (OJJDP FY2009 program title; multi-site study of youth in the sex trade, six sites)" **Office of Juvenile Justice and Delinquency Prevention**, OJJDP FY2009 Research on the Commercial Sexual

Exploitation of Children 2009-MC-CX-0001 ($1.3M)

19. Sep 2009–Aug 2011, co-PI (Dombrowski PI), "Injection Drug User Network Topologies and HIV Stabilization Dynamics" **National Institutes of Health**, National Institute on Drug Abuse (Challenge Grant) RC1DA028476 ($736,858)
20. Jul 2009–Jun 2013, co-PI (with Dombrowski), "A Comparison of Informal Networks in Two Labrador Communities" **National Science Foundation**, Arctic Social Sciences (ARC) NSF ARC-0908155 ($560,166)
21. May 2008–Apr 2009, co-I (with Dombrowski), "Faculty Scholars Award: Stochastic Modeling of IDU Network Factors for HIV Stabilization Dynamics" **National Science Foundation**, Methodology, Measurement and Statistics (BCS) NSF BCS-0752680 ($40,560)
22. Sep 2007–May 2008, Principal Investigator, "Information Acquisition and Delivery for Disaster Recovery Teams" **National Security Agency**, Network Sciences Program H98230-07-1-0115 ($74,000)
23. Jun 2007–Jun 2009, co-I (Travis Wendel, PI), "Dynamics of retail methamphetamine markets in New York City" **National Institute of Justice**, NIJ FY07 ORE Continuations 2007-IJ-CX-0110 ($475,337)
24. Sep 2005–May 2007, Principal Investigator, "Computational Aspects of Algebraic Geometry over Groups" **National Security Agency**, Mathematical Sciences Program H98230-06-1-0042 ($30,000)

UNDERGRADUATE TEACHING EXPERIENCE

Cross-disciplinary courses at Lehigh University

- Applied Machine Learning in the health sciences
- Biostatistics 101: Regression methods and survival analysis
- Biostatistics Lab 103: R programming

Cross-disciplinary courses at the University of Nebraska-Lincoln

- Machine Learning in the social sciences
- Agent-based modeling and simulation

Computer science courses at John Jay College, City University of New York

- Introduction to programming (Java, C++, C)
- Object oriented programming and Design Patterns
- Programming languages (Java, ML, Prolog, Lisp, and others)
- Data structures
- Algorithms
- Android App programming
- Networking
- Network security and digital forensics (A draft manuscript of a book based on the lab component for such a course can be found here: https://drive.google.com/drive/folders/1Mdqg5volOnW4oFNFIS6_BxcFBB6WVKQN)
- Databases (MySQL, ElasticSearch, Redis)
- Software Engineering Capstone Project (2 semester sequence)

Mathematics courses at John Jay College, City University of New York

- Probability and Statistics
- Discrete mathematics
- Combinatorics and Graph theory

GRADUATE TEACHING EXPERIENCE

Cross-disciplinary courses at Lehigh University

- Introduction to Data Science
- Prompt Engineering

Cross-disciplinary courses at the University of Nebraska-Lincoln

- Applied Machine Learning in the Health Sciences

- Machine Learning in the social sciences
- Agent-based modeling and simulation

Computer science courses at Graduate Center, City University of New York

- Social network analysis
- Network security
- Digital forensics
- Operating system security

ADVISEMENT & MENTORSHIP

Post-docs

1. Mohamed Saad (PhD City University of New York, Computer Science) now Postdoctoral Research Associate, Lehigh University College of Health (Health Data Warehouse)
2. Elspeth Ready (PhD Stanford University, Anthropology) now Senior researcher, Max Planck Institute for Evolutionary Anthropology (Human Behavior, Ecology and Culture)
3. Patrick Habecker (PhD University of Nebraska-Lincoln, Sociology) now Research Assistant Professor, Rural Drug Addiction Research Center, University of Nebraska-Lincoln; co-director, Longitudinal Networks Center
4. Hsuan-Wei Lee (PhD University of North Carolina, Mathematics) now Assistant Professor, College of Health, Lehigh University (faculty associate in Mathematics); earlier Academia Sinica, Institute of Sociology
5. Dane Hautala (PhD University of Nebraska-Lincoln, Sociology) now Assistant Scientist, Johns Hopkins Center for Indigenous Health (formerly Center for American Indian Health)
6. G. Robin Gauthier (PhD Duke University, Sociology) now Assistant Professor of Sociology, University of Nebraska-Lincoln

Doctoral Students

1. Josey VanOrsdale, co-Advisor, 2023, University of Nebraska-Lincoln
   Adaptive Respondent-Driven Sampling of Social Networks: A Simulation-based Study using Machine Learning
2. Ian Duncan, co-Advisor, 2019, University of Nebraska-Lincoln
   An Examination of Capital in a Network of People Who Inject Drugs
3. Anna Wisniewska, Advisor, 2019, CUNY Graduate Center
   An evolutionary perspective on foraging strategies and group dynamics in bio-social inspired Cognitive Radio networks
4. Yuri Cantor, Advisor, 2017, CUNY Graduate Center
   Morphogenesis and Growth Driven by Selection of Dynamical Properties
5. Mohamed Saad, Advisor, 2010, CUNY Graduate Center
   Secure critical care resource optimization based on heterogeneous vital signs
6. Zeki Bilgin, Advisor, 2010, CUNY Graduate Center
   Enhancing the performance of active connections in MANETs through dynamic route and power optimization
7. Omer Demir, Advisor, 2010, CUNY Graduate Center
   A Scalable Agent-based System for Network Flow Reconstruction with Applications to Determining the Structure and Dynamics of Distributed Denial of Service Attacks
8. Eman Abdu, Advisor, 2009, CUNY Graduate Center
   Clustering Categorical Data using Summaries and Spectral Techniques

Masters Students

1. Koushik Vennalakanti, In progress, Lehigh University

Quantized Monte-Carlo simulations of financial time series

2. Ojaswi Joshi, In progress, Lehigh University
   Using LLMs to compute multi-level representations of large text corpora
3. Gisela Font Sayeras, co-Advisor, 2020, University of Nebraska-Lincoln
   Open Dynamic Interaction Network: A Cell-phone Based Platform for Responsive EMA
4. Tamer Oguz, Advisor, 2014, John Jay College of Criminal Justice (CUNY)
   Social Network Analysis Using Perceptual Tomography
5. Fatih Istikas, Advisor, 2014, John Jay College of Criminal Justice (CUNY)
   Applications of subspace clustering to scalable digital document forensics
6. Cesar Vargas, Advisor, 2014, John Jay College of Criminal Justice (CUNY)
   MEDS: Malware Evolution Discovery System
7. Jessica Jaquez, Advisor, 2013, John Jay College of Criminal Justice (CUNY)
   Towards Scalable E-Discovery using Content-based Hierarchical File Clustering
8. Cindy Zimmerman, Advisor, 2013, John Jay College of Criminal Justice (CUNY)
   An Evaluation of Private-Sector Digital Forensics Processes and Practices
9. David Chan, Advisor, 2011, John Jay College of Criminal Justice (CUNY)
   JJ-BCI: A Prototype Platform for Brain Fingerprinting and Cognitive Forensics
10. Carol Dottin, Advisor, 2009, John Jay College of Criminal Justice (CUNY)
    CONCERT Cooperative Networking and Control for Emergency Response Teams
11. Juseop Lim, Advisor, 2008, John Jay College of Criminal Justice (CUNY)
    A Feasibility Study on Wireless Device Location using a Single Directional Wireless Antenna
12. Jaroslav Paduch, Advisor, 2008
    Covert channels using IP packet permutations
13. Jamie Levy, Advisor, 2007, John Jay College of Criminal Justice (CUNY)
    METAL Memory Encryption
14. Ghassen Ben Brahim, Advisor, 2007, University of Missouri, Columbia
    TRON: Toolkit for Routing in Optical Networks
15. Richard Alcalde, Advisor, year not recorded, John Jay College of Criminal Justice (CUNY)
    Efficient data mining of forensic metadata from multi-disk environments

Recent Undergraduate Students

16. Anya Kumar, 2025, Independent study on Elasticsearch extensions (Lehigh University)
17. Nicholas Thomas, 2025, Independent study on Logstash extensions (Lehigh University)
18. Anthony Matera, 2025, Independent study on Kibana extensions (Lehigh University)
19. Catherine Black, 2023, Independent study on Neural networks (Lehigh University)
20. Jace Hannah, 2023, Independent study on Python programming (Lehigh University)

SELECTED TALKS

May 10, 2023. ODSC Conference, Boston, Massachusetts. Applications of machine learning in just-in-time interventions

November 18, 2021. Brown University, Opioid Overdose COBRE. ODIN: A new platform for the collection of contextual social-behavioral data from cohorts over long time scales

May 10, 2021. Lehigh University, College of Health. A new platform for the collection of contextual social-behavioral data from cohorts over long time scales

May 6, 2021. Oklahoma State University, Computer Science Department. Analyzing contextual social-behavioral data from cohorts over long time scales

April 21, 2021. Bryant University, Computer Science Department. New directions in modelling and simulation

of socially networked populations

March 1, 2021. University of North Carolina-Charlotte, Computer Science Department. New directions in public health: modelling and simulation of socially networked populations

January 27, 2021. University of Bolzano, Italy, Computer Science Department. New directions for inference on social networks

October 2, 2020. University of Nebraska-Lincoln, College of Business. ODIN: A new platform for the collection of contextual social-behavioral data from cohorts over long time scales

SERVICE

Directorship of Centers

- **Health Data Warehouse** (Lehigh University) 2022–present
- **Longitudinal networks Core Facility** (University of Nebraska-Lincoln) 2018–2022

New Program Development

- Created undergraduate program in biostatistics and health data science at Lehigh University
- Created MSc program in biostatistics and health data science at Lehigh University
- Created undergraduate program in Digital Forensics and Cybersecurity at City University of New York
- Created MS program in Digital Forensics and Cybersecurity at City University of New York

University-wide Service

- Graduate Research Committee (GRC) Member, 2022–present
- GRC Course and Curriculum Subcommittee Member, 2022–present
- Council for Equity and Community (CEC) Member, 2022–2023
- Research Advisory Council Member, 2022–present
- Data Governance Executive Committee Member, 2023–present
- University P&T Committee Member, 2023–present

College/Department-wide Service

- Research Advisory Council Member, 2022–present
- CoH Forlenza Search Committee Chair, 2023–present
- CoH Biostatistics Tenure Track Search Committee Chair, 2023–present
- PCREAS Health Data Science Tenure Track Search Committee Member, 2023–present
- BHDS New Major Curriculum Committee Chair, 2022–present
- Vital Conditions Working Group Member, 2023–present